What is claimed is:

1. A high-speed low-noise charge pump comprising:

an output node;

a first cascode current mirror coupled to a first reference current source and adapted to generate a first mirror current, including a first output mirror transistor and a first output cascode transistor;

a second cascode current mirror coupled to a second reference current source and adapted to generate a second mirror current, including a second output mirror transistor and a second output cascode transistor coupled to the first output cascode transistor at the output node;

a first switching transistor being turned on during assertion of a first control signal to cause the first mirror current to flow through the output node, having a gate, a source and a drain where the source of the first switching transistor is coupled to the first output mirror transistor, the drain of the first switching transistor is coupled to the first output cascode transistor, and the gate of the first switching transistor receives the first control signal; and

a second switching transistor being turned on during assertion of a second control signal to cause the second mirror current to flow through the output node, having a gate, a source and a drain where the source of the second switching transistor is

coupled to the second output mirror transistor, the drain of the second switching transistor is coupled to the second output cascode transistor, and the gate of the second switching transistor receives the second control signal.

2. The charge pump as recited in claim 1 wherein:

the first output mirror, the first output cascode and the first switching transistors are n-channel MOS transistors; and

the second output mirror, the second output cascode, and the second switching transistors are p-channel MOS transistors.

3. The charge pump as recited in claim 2 wherein:

the first output mirror transistor has a drain coupled to the source of the first switching transistor and a source coupled to ground;

the first output cascode transistor has a source coupled to the drain of the first switching transistor and a drain coupled to the output node;

the second output mirror transistor has a drain coupled to the source of the second switching transistor and a source coupled to a voltage supply; and

the second output cascode transistor has a source coupled to the drain of the second switching transistor and a drain coupled to the first output cascode transistor at the output node.

4. The charge pump as recited in claim 1 wherein the first and the second cascode current mirrors are a wide-swing cascode current mirror.

5. The charge pump as recited in claim 4 wherein:
the first cascode current mirror further comprises:
a first input mirror transistor coupled between the first output mirror transistor and ground; and
a first input cascode transistor coupled between the first output cascode transistor and the first reference current source;
the second cascode current mirror further comprises:
a second input mirror transistor coupled between the second output mirror transistor and a voltage supply; and
a second input cascode transistor coupled between the second output cascode transistor and the second reference current source.

6. The charge pump as recited in claim 5 wherein:
the first input mirror and the first input cascode transistors are n-channel MOS transistors; and
the second input mirror and the second input cascode transistors are p-channel MOS transistors.

7. The charge pump as recited in claim 6 wherein:
the first input mirror transistor has a gate coupled to the first output mirror transistor and a source coupled to the ground;

the first input cascode transistor has a gate coupled to the first output cascode transistor and a drain coupled to the gate of the first input mirror transistor and the first reference current source;

the second input mirror transistor has a gate coupled to the second output mirror transistor and a source coupled to the voltage supply; and

the second input cascode transistor has a gate coupled to the second output cascode transistor and a drain coupled to the gate of the second input mirror transistor and the second reference current source.

8. A high-speed low-noise charge pump comprising:

an output node;

a reference current source providing a supply current;

a first cascode current mirror coupled to the reference current source and adapted to generate a first mirror current from the supply current, including a first output mirror transistor and a first output cascode transistor;

a second cascode current mirror coupled to the reference current source and adapted to generate a second mirror current from the supply current, including a second output mirror transistor and a second output cascode transistor coupled to the first output cascode transistor at the output node;

a first switching transistor interposed between the first output mirror and the first output cascode transistors, being turned on during assertion of a first control signal to cause the first mirror current to flow through the output node; and

a second switching transistor interposed between the second output mirror and the second output cascode transistors, being turned on during assertion of a second control signal to cause the second mirror current to flow through the output node.

9. The charge pump as recited in claim 8 wherein:

the first switching transistor has a gate, a source and a drain, where the source of the first switching transistor is coupled to the first output mirror transistor, the drain of the first switching transistor is coupled to the first output cascode transistor, and the gate of the first switching transistor receives the first control signal; and

the second switching transistor has a gate, a source and a drain, where the source of the second switching transistor is coupled to the second output mirror transistor, the drain of the second switching transistor is coupled to the second output cascode transistor, and the gate of the second switching transistor receives the second control signal.

10. The charge pump as recited in claim 9 wherein:

the first output mirror, the first output cascode and the first switching transistors are n-channel MOS transistors; and

the second output mirror, the second output cascode, and the second switching transistors are p-channel MOS transistors.

11. The charge pump as recited in claim 10 wherein:

the first output mirror transistor has a drain coupled to the source of the first switching transistor and a source coupled to a first voltage supply;

the first output cascode transistor has a source coupled to the drain of the first switching transistor and a drain coupled to the output node;

the second output mirror transistor has a drain coupled to the source of the second switching transistor and a source coupled to a second voltage supply; and

the second output cascode transistor has a source coupled to the drain of the second switching transistor and a drain coupled to the first output cascode transistor at the output node.

12. The charge pump as recited in claim 9 wherein the first and the second cascode current mirrors are a wide-swing cascode current mirror.

13. The charge pump as recited in claim 12 wherein:

the first cascode current mirror further comprises:

a first input mirror transistor coupled between the first output mirror transistor and a first voltage supply; and

a first input cascode transistor coupled between the first output cascode transistor and the first reference current source;

the second cascode current mirror further comprises:

a second input mirror transistor coupled between the second output mirror transistor and a second voltage supply; and

a second input cascode transistor coupled between the second output cascode transistor and the second reference current source.

14. The charge pump as recited in claim 13 wherein:

the first input mirror and the first input cascode transistors are n-channel MOS transistors; and

the second input mirror and the second input cascode transistors are p-channel MOS transistors.

15. The charge pump as recited in claim 14 wherein:

the first input mirror transistor has a gate coupled to the first output mirror transistor and a source coupled to the first voltage supply;

the first input cascode transistor has a gate coupled to the first output cascode transistor and a drain coupled to the gate of the first input mirror transistor and the first reference current source;

the second input mirror transistor has a gate coupled to the second output mirror transistor and a source coupled to the second voltage supply; and

the second input cascode transistor has a gate coupled to the second output cascode transistor and a drain coupled to the gate of the second input mirror transistor and the second reference current source.

16. A high-speed low-noise charge pump having an output node, comprising:

a first cascode current mirror coupled to a reference current source, including a first output mirror transistor and a first output cascode transistor, for generating a first mirror current;

a first switching transistor receiving a first control signal and interposed between the first output mirror and the first output cascode transistors, for causing the first mirror current to flow through the output node when the first control signal is asserted;

a second cascode current mirror coupled to the first cascode current mirror at the output node, for generating a second mirror current; and

a second switching transistor receiving a second control signal, for causing the second mirror current to flow through the output node when the second control signal is asserted.

17. The charge pump as recited in claim 16 wherein the first switching transistor has a gate, a source and a drain,

where the source of the first switching transistor is coupled to the first output mirror transistor, the drain of the first switching transistor is coupled to the first output cascode transistor, and the gate of the first switching transistor receives the first control signal.

18. The charge pump as recited in claim 17 wherein:

the first output mirror transistor has a drain coupled to the source of the first switching transistor and a source coupled to a voltage supply; and

the first output cascode transistor has a source coupled to the drain of the first switching transistor and a drain coupled to the output node.

19. The charge pump as recited in claim 16 wherein the first and the second cascode current mirrors are a wide-swing cascode current mirror.

20. The charge pump as recited in claim 19 wherein the first cascode current mirror further comprises:

a first input mirror transistor having a gate coupled to the first output mirror transistor and a source coupled to a voltage supply; and

a first input cascode transistor having a gate coupled to the first output cascode transistor and a drain coupled to the gate of the first input mirror transistor and the reference current source.